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STATUS OF THE PEACEKEEPER (MX) WEAPON SYSTEM(U) GENERAL 1/1  
ACCOUNTING OFFICE WASHINGTON DC NATIONAL SECURITY AND  
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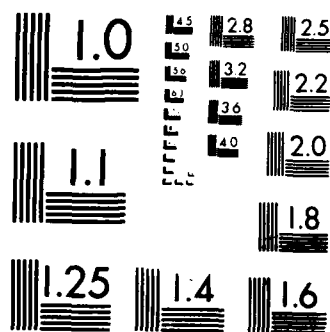
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BY THE U.S. GENERAL ACCOUNTING OFFICE

## Report To The Secretary Of Defense

AD-A143 486

### Status Of The Peacekeeper (MX) Weapon System

Based on four successful test flights to date, the Air Force believes it will meet the December 1986 Peacekeeper initial deployment date specified by the Congress. However, some flight testing planned to take place before missile deployment is now scheduled for completion after deployment. Also, production of some major components will begin before they are flight tested.

Peacekeeper's performance relative to the Soviet threat has not been formally reevaluated since 1979. DOD officials stated a revalidated threat assessment will be available in September 1984, and Peacekeeper performance will be evaluated relative to the revised threat.

GAO identified shortcomings in the way costs are being reported in the Selected Acquisition Report and recommended corrective measures.

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UNITED STATES GENERAL ACCOUNTING OFFICE  
WASHINGTON, D.C. 20548

NATIONAL SECURITY AND  
INTERNATIONAL AFFAIRS DIVISION

B-196893

The Honorable Caspar W. Weinberger  
The Secretary of Defense

Dear Mr. Secretary:

This report examines the current development and production status of the Peacekeeper (MX) weapon system.

The report contains recommendations to you on pages 7 and 13. As you know, 31 U.S.C. §720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Chairmen, House and Senate Committees on Armed Services and on Appropriations; the Chairman, Senate Committee on Governmental Affairs; the Chairman, House Committee on Government Operations; the Director, Office of Management and Budget; and the Secretary of the Air Force.

Sincerely yours,

*Bill W. Thurman*  
for Frank C. Conahan  
Director

D I G E S T

The Peacekeeper weapon system (formerly MX) is a new intercontinental ballistic missile system. As currently planned, the Air Force will deploy 100 Peacekeeper missiles in existing Minuteman missile silos in Nebraska and Wyoming. The Peacekeeper missile, designed to deliver 10 independently targetable warheads, is part of a modernization program to improve the capabilities of the U.S. strategic forces. The Air Force estimates the current Peacekeeper costs at \$16.6 billion (fiscal year 1982 dollars), which equates to \$21.7 billion in then year dollars.

GAO made this review as a part of its continued monitoring of major Department of Defense (DOD) weapon acquisition programs. Specifically, GAO examined the Peacekeeper program to assess the Air Force's success in meeting program acquisition goals and to identify risks, if any, as the missile proceeds toward production. The review was limited to analyzing missile development because the basing plans changed and little activity had taken place under the current basing plan.

STATUS OF PEACEKEEPER

The Peacekeeper program, which includes a missile and a basing system, began full-scale development in September 1979. However, basing plans intended to provide for missile survivability, were not acceptable. The current basing plan, recommended by the President's Commission on Strategic Forces in April 1983, and endorsed by the President, was approved by the Congress in May 1983. During this period of basing uncertainty, development of the Peacekeeper missile continued.

Several contracts to start missile production were awarded in early 1984. Based on four successful test flights of development missiles, the Air Force is confident that it can meet the December 31, 1986, initial deployment date specified by the Congress.

## RESULTS OF THE REVIEW

The Peacekeeper missile program is reported to be meeting cost, schedule, and performance requirements. However, GAO noted the following.

Estimated missile unit cost increased since the beginning of full-scale development in 1979. This cost growth is not reflected in the Peacekeeper Selected Acquisition Report (SAR) because (1) a current cost estimate, rather than the estimate at full-scale development, is used as the cost baseline and (2) missile costs are merged with basing costs. (See pp. 6 and 7.)

--The program cost reported in the SAR is not the total cost of the program as required by DOD instructions. Rather, it is the estimated cost to complete the program from 1983 to 1990. It does not include \$4.6 billion of prior costs incurred between 1979 and 1983, although these costs are shown in SAR footnotes. (See pp. 5 and 6.)

--The Congress specified that the Air Force deploy the first 10 missiles by December 31, 1986. To meet this date, some flight testing planned before missile deployment to verify performance of the production model will not be completed until after deployment. Also, several major missile components being changed or redesigned--such as the reentry vehicle and guidance and control components--will enter production before flight testing. (See pp. 9 to 12.)

--Warhead range decreased as a result of using the MK 21 reentry vehicle in place of the MK 12A vehicle. (See p. 10.)

--The range reduction will, however, be mitigated by basing Peacekeeper further north, in Nebraska and Wyoming rather than Utah and Nevada as earlier planned. (See p. 10.)

--Soviet silo hardness increased three-fold since full-scale development of the missile began. Because of this increased hardness, the Peacekeeper's probability of inflicting the desired level of damage to Soviet targets may be impaired. Improved accuracy and/or higher warhead yield could offset the

increased target hardness, but the Soviet threat and related Peacekeeper technical performance to meet the threat have not been updated since 1979. (See p. 12.)

### CONCLUSIONS

Peacekeeper costs incurred before 1983, although shown in a footnote to the SAR, are not included in the current program cost estimate. GAO believes that in the interest of consistency and completeness in reporting costs under the SAR system, the Peacekeeper program should be reported in accordance with DOD instructions. GAO also believes that segregating basing and missile costs in the SAR would provide a better understanding of total Peacekeeper cost.

The Air Force, in order to meet the deployment deadline, will begin production of a number of components whose performance in the Peacekeeper system will not have been verified through flight test. Until the Air Force has a final design for the Peacekeeper missile that has been fully tested, the potential for changes exists and the possibility of performance degradation is present. Changes have already occurred whose impact on system performance the Air Force can only estimate. Peacekeeper program officials, however, are confident that the missile will meet performance requirements. To date, mitigating factors appear to have offset reduced missile performance, enabling the Peacekeeper to stay within established performance parameters.

The ability of the Peacekeeper to accomplish its mission, however, may have been impaired because a major change has occurred in the threat it was initially designed to overcome. Formal reassessments of the ability of the Peacekeeper to meet the expected threat have not been made. There is some risk that threat changes may require modifications to the missile to improve its performance.

### RECOMMENDATIONS

GAO recommends that the Secretary of Defense:

- Revise the Peacekeeper SARs to show  
(1) total estimated program cost from the time of program inception, (2) the cost estimate at the time of full-scale

development approval as the baseline for measuring cost status and progress for the program, and (3) missile and basing costs separately.

--Update the Soviet threat assessment and evaluate Peacekeeper's technical performance relative to the revised threat.

#### AGENCY VIEWS

DOD officials disagreed with GAO's views on the Peacekeeper SAR. Specifically, they disagreed on the dates for accumulating program cost and for tracking cost incurrence. They stated that because of the directive nature of the President's Commission on Strategic Forces, they considered the approved Peacekeeper program as commencing with the April 1983 Commission report. DOD officials believed there was no need to separately track missile and basing costs in the SAR.

DOD officials agreed that the Peacekeeper's technical performance should be updated. They stated they plan to reevaluate Peacekeeper performance relative to a new threat assessment to be published in September 1984.



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## ABBREVIATIONS

DOD	Department of Defense
GAO	General Accounting Office
ICBM	Intercontinental Ballistic Missile
SAR	Selected Acquisition Report

## CHAPTER 1

### INTRODUCTION

The U.S. strategic nuclear forces consist of submarine launched ballistic missiles, manned bombers (some armed with cruise missiles), and land-based intercontinental ballistic missiles (ICBMs). Since the 1960s, this triad of nuclear forces has contributed to the primary objective of the nation's strategic forces--deterrence of nuclear war. For several years, national leaders have been concerned that the deterrent value of the triad has been eroded by Soviet improvements to their strategic forces. To correct this condition, several modernization programs are in progress to improve the capabilities of the U.S. strategic forces. This report concentrates on the Peacekeeper ICBM modernization program.

#### ICBM MODERNIZATION INITIATIVES

In 1972, the Air Force's Strategic Air Command articulated the requirement for a new ICBM. It determined that the new missile should be able to destroy hardened targets and should be based in a survivable manner. Subsequently, the Air Force validated the requirement for a new ICBM and the MX program (changed to Peacekeeper in November 1982) was initiated. A diagram of the major sections of the Peacekeeper missile is shown on the next page.

Full-scale development of the MX weapon system began in September 1979, about 2 years later than planned. The mode of survivable basing selected was referred to as multiple protective shelter basing. Under this concept, survivability would be achieved by moving 200 missiles among 4,600 shelters without revealing the missiles' actual locations. The decision to develop multiple protective shelter basing did not, however, stop the controversy about Peacekeeper basing.

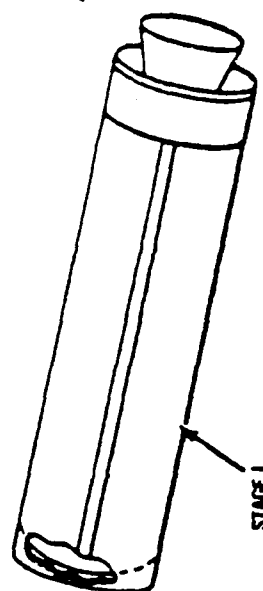
Upon taking office in January 1981, President Reagan initiated an overall review of the status of U.S. strategic forces and the alternatives to modernize the forces to meet the deterrent needs of the late 1980s and beyond. In October 1981, the President announced his program to revitalize U.S. strategic forces, including modernization of the ICBM force. The U.S. ICBM force at that time was basically a product of the 1960s technology, consisting of 52 Titan II missiles and 450 Minuteman II missiles fielded in the 1960s and 550 Minuteman III missiles fielded in the early 1970s. None of the U.S. ICBMs could effectively damage hardened Soviet silos. The President's ICBM modernization program called for

--continued development of the Peacekeeper missile with near-term interim deployment in Titan or Minuteman silos modified to increase silo hardness,

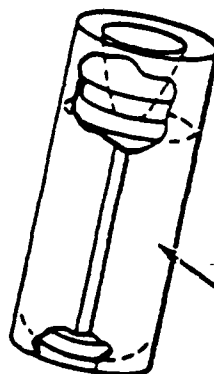
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REENTRY SYSTEM REENTRY VEHICLES

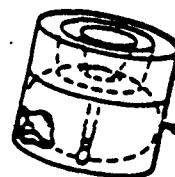
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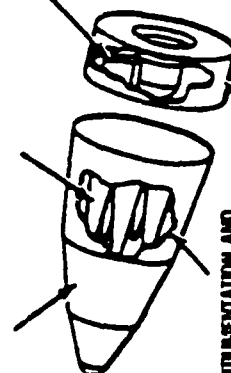
STAGE I



STAGE II



STAGE III



STAGE IV

PEACEKEEPER MISSILE

ICOURTESY OF U.S. AIR FORCE

--cancellation of multiple protective structure basing development, and

--deactivation of the Titan II missiles.

The Congress, however, rejected the President's proposal for interim Peacekeeper missile deployment, expressing concern about the feasibility and desirability of such a temporary program from technical, military, arms control, and cost points of view.

On November 22, 1982, the President proposed deploying 100 Peacekeeper missiles in an array of 100 closely spaced, super-hardened silos located near F.E. Warren Air Force Base, Wyoming.

The Congress, in December 1982, also rejected this proposal in enacting the fiscal year 1983 continuing resolution. The Congress provided funds for missile development but not for missile procurement, restricted obligation or expenditure of funds for full-scale development of a basing mode, and prohibited flight testing until both Houses of the Congress approve the basing mode.

Following the actions taken by the Congress, the President, in January 1983, established a Commission on Strategic Forces to examine basing modes for the Peacekeeper system in connection with overall U.S. strategic force modernization alternatives. In its April 19, 1983, report, the Commission recommended

--placing 100 Peacekeeper missiles in existing Minuteman silos,

--development of a new small ICBM, and

--investigation of hardened silos, shelters, and mobile launchers.

The Commission believed the Peacekeeper missile was needed promptly to remove the Soviet advantage in ICBM capability and to encourage the Soviets to seek arms control agreements.

In April 1983 the President endorsed the Commission's recommendations, and in May 1983 the Congress gave its approval; thus, removing the restrictions contained in the fiscal year 1983 continuing resolution.

Following congressional approval of a basing mode, the Secretary of Defense directed production of the Peacekeeper missile. In its fiscal year 1984 request for appropriations, the Department of Defense (DOD) requested funds to produce the first 27 Peacekeeper missiles. The Congress, however, appropriated funds for only 21 missiles. In authorizing fiscal year 1984 funds for DOD, the Congress directed the Air Force to deploy 10 Peacekeeper missiles in Minuteman silos near F.E. Warren Air Force Base by December 31, 1986.

## PROGRAM FUNDING

The Air Force estimate of the current Peacekeeper program is \$16.6 billion (fiscal year 1982 dollars) which equates to \$21.7 billion in then year dollars. This is the estimate included in the report by the President's Commission on Strategic Forces, April 19, 1983. The estimate, which is the official estimate used in the Peacekeeper Selected Acquisition Report (SAR), excludes \$3.2 billion spent on the missile and \$1.4 billion spent on basing developments from 1979 to 1983. Program costs are discussed in chapter 2.

## PROGRAM MANAGEMENT

The Air Force's Ballistic Missile Office, Norton Air Force Base, California, is responsible for managing the Peacekeeper program. The Defense Systems Group of the TRW Corporation supports the Ballistic Missile Office with system engineering/technical assistance. To develop and procure the Peacekeeper weapon system, the Ballistic Missile Office uses an "associate contractor" concept. Under this method, the Ballistic Missile Office integrates the activities of several major contractors who develop and build portions of the weapon system. This approach differs from the method of procuring a system through a "prime contractor" where a single contractor would have overall engineering responsibility.

## OBJECTIVE, SCOPE, AND METHODOLOGY

Our objective was to review selected aspects of the Peacekeeper program to assess DOD's abilities to meet acquisition goals and to identify the risks, if any, being assumed as the missile progresses into production. Our review was limited to an examination of the Peacekeeper missile's development. It did not include assessments of the basing plan approved in May 1983 or other elements of the ICBM modernization program.

We reviewed pertinent documents and held discussions with officials at the Ballistic Missile Office, Norton Air Force Base, California; Western Space and Missile Center, Vandenberg Air Force Base, California; Strategic Air Command Headquarters, Offutt Air Force Base, Nebraska; Air Force Systems Command Headquarters, Andrews Air Force Base, Maryland; Air Force Headquarters and the Office of the Secretary of Defense, Washington, D.C.; and one Peacekeeper associate contractor.

## CHAPTER 2

### PROGRAM COST HISTORY AND MISSILE

#### COST GROWTH NOT ADEQUATELY DISCLOSED

The current estimated costs of the Peacekeeper program is \$16,635 million in fiscal year 1982 dollars or \$21,680 million in then year dollars. This is the estimate included in the April 19, 1983, report by the President's Commission on Strategic Forces. In addition, this estimate is provided to the Congress in key DOD reporting documents, such as the Peacekeeper SAR.

The Peacekeeper program cost estimate represents the estimated cost to complete the program from 1983, but it does not include prior missile cost of \$3,199 million or earlier basing mode cost of \$1,399 million. In addition, the SAR estimates for the Peacekeeper program do not segregate basing and missile costs. Thus, missile unit cost growth of about \$11 million, or 66 percent is obscured. Since the beginning of full-scale development in 1979, cost of the missile increased from \$16.6 million per unit (based on 329 missiles of which 200 were for deployment) to \$27.6 million per unit (based on 223 missiles of which 100 are for deployment).

#### INCOMPLETE PROGRAM COST REPORTED IN THE PEACEKEEPER SAR

One means used by the Congress to follow major weapons system acquisition programs and their related cost performance is the SAR. This report normally is first submitted at the beginning of full-scale development and at periodic intervals thereafter until the acquisition program is complete. Because of the uncertainty about basing, DOD submitted the first SAR for the Peacekeeper program for the period ending June 30, 1983, almost 4 years after the beginning of full-scale development. DOD chose to use as the initial program cost estimate the Peacekeeper acquisition cost from 1983 to 1990. This estimate was as follows:

#### Peacekeeper SAR Program Cost Estimate

	<u>1982 dollars</u>	<u>Escalation FY 1983-90 (millions)</u>	<u>Total</u>
Development	\$ 6,018	\$ 879	\$ 6,897
Procurement	10,292	4,086	14,378
Construction	325	80	405
Total	<u>\$16,635</u>	<u>\$5,045</u>	<u>\$21,680</u>

This estimate did not include \$3,199 million of prior missile costs or \$1,399 million of prior costs for earlier basing modes. Therefore, what is portrayed in the Peacekeeper SAR as the program cost is an estimate to complete the program rather than the total cost of the program. A footnote to the SAR explained that these costs were not included in the estimate. This presentation is not in accord with DOD instructions that SAR estimates include all program acquisition costs applicable to the approved program regardless of the program's stage of development.

MISSILE ACQUISITION COST  
INCREASES NOT DISCLOSED IN SAR

Total program costs are better understood if costs of major elements are readily identifiable. The Peacekeeper SAR does not segregate missile and basing cost, consequently, missile cost growth is not separately identified. For example, a comparison of the current cost estimate with missile unit cost at the time of full-scale development shows cost has increased. Missile development and production cost estimates have not been affected to any large extent by the many basing mode changes. The following table shows a comparison of unit missile cost at full-scale development in September 1979 and the current unit missile cost we calculated using data supporting the June 30, 1983, Peacekeeper SAR.

Comparison of Peacekeeper  
Unit Missile Cost  
(in 1982 dollars--millions)

	<u>Full-scale dev. estimate</u>			<u>Current estimate</u>			<u>Per unit increase</u>	
	<u>Tot. Cost</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Tot. Cost</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Amount</u>	<u>Percent<sup>a</sup></u>
Program acquisition cost <sup>b</sup>	\$9,662	349	\$28 <sup>b</sup>	\$11,258	243	\$46	\$18	67 %
Procurement cost <sup>c</sup>	\$5,480	329	\$17 <sup>c</sup>	\$ 6,165	223	\$28	\$11	66 %

<sup>a</sup>Computed prior to rounding of unit costs.

<sup>b</sup>Program acquisition unit cost is the total cost for development, procurement, and related military construction divided by the total number of missiles to be produced.

<sup>c</sup>Procurement unit cost is the total cost for procurement divided by the number of production missiles.

The reduction in the quantity of missiles was one reason for the increase in unit costs. However, missile costs also increased as a result of other factors. To estimate the amount, we used the same estimating assumptions and methodologies employed by the Air

Force at the time of full-scale development and calculated the costs to develop and produce the current quantity of 243 missiles. We also put all costs in 1982 dollars, the same as the current Air Force estimate. Putting the estimates prepared at different times on the same quantity and year basis showed the following:

Comparison of Missile Acquisition  
Cost Estimates  
(in 1982 dollars--millions)

	<u>At time of full-scale dev.</u>	<u>Based on SAR</u>	<u>Increase</u>	
			<u>Amount</u>	<u>Percent</u>
Development	\$ 4,182	\$ 5,093	\$ 911	
Procurement	4,071	6,165	2,094	
Total	<u>\$ 8,253</u>	<u>\$11,258</u>	<u>\$3,005</u>	36 %

Data provided to us by the Ballistic Missile Office showed that the cost increases resulted from changes to the program or problems that developed. For example, the largest cost increase in the development area, \$330 million, was due to a change in the reentry vehicle<sup>1</sup>--the decision in January 1982 to change from the existing MK 12A to the new MK 21 reentry vehicle. The largest procurement cost increase, \$855 million, was in the guidance and control subsystem. This resulted because of problems in quantity production of the inertial measurement unit<sup>2</sup> and other elements of the guidance and control subsystem.

The Air Force agreed that missile cost increases have occurred for reasons other than the reduced quantity of Peacekeeper missiles. Reasons for the increases provided by the Program Office include the reasons mentioned above and a stretchout of the development program.

CONCLUSIONS AND RECOMMENDATIONS

Peacekeeper costs incurred before 1983, although shown in a footnote to the SAR, are not included in the current program cost estimate. We believe that in the interest of consistency and completeness in reporting costs under the SAR system, the Peacekeeper program should be reported in accordance with DOD instructions. We also believe segregating basing and missile cost would provide a better understanding of total Peacekeeper cost. Accordingly, we

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<sup>1</sup>Reentry vehicle is the shell, generally in the shape of a cone, which protects the missile warhead during its reentry through the earth's atmosphere.

<sup>2</sup>Inertial measurement unit is the device that measures changes in the missile's speed and direction.



recommend that the Secretary of Defense revise the Peacekeeper SAR to show (1) total estimated program cost from the time of program inception, (2) the cost estimates at the time of full-scale development approval as the baseline for measuring cost status and progress for the program, and (3) missile and basing costs separately.

#### AGENCY COMMENTS AND OUR EVALUATION

DOD officials were of the opinion that total Peacekeeper cost was being reported in the SAR. The total cost to be reported hinges on what is considered to be the Peacekeeper program, and they believe the program started with the adoption of the recommendations made by the President's Commission on Strategic Forces.

The officials stated that while it is true that SARs generally include prior cost as part of the program acquisition cost baseline, the Department of Defense decided that due to the turbulent history of this program, the most meaningful approach for reporting Peacekeeper costs and changes to the Congress was to make the program acquisition cost baseline consistent with the Commission's report (\$16.6 billion in fiscal year 1982 dollars).

While the Peacekeeper program has had a turbulent history, we continue to believe that program acquisition cost should include all costs.

DOD did not agree that separate reporting of missile and basing costs was necessary.

The SAR report is intended to be presented so that meaningful data is available for tracking program progress. Reporting basing cost and missile costs as separate estimates, we believe, provides the visibility necessary to assess cost performance. For example, a segregation of costs, coupled with an inclusion of all costs, would have disclosed the growth in the unit cost of the missile.

## CHAPTER 3

### POTENTIAL PERFORMANCE

#### RISKS IN THE PEACEKEEPER PROGRAM

To be an effective deterrent, the Peacekeeper missile must be able to successfully attack the full spectrum of Soviet targets, including superhardened<sup>1</sup> targets. This requires the missile to have the capability to deliver warheads to intended targets and to inflict the desired level of damage. At this time, the Air Force expects the Peacekeeper missile will perform its operational mission even though the mission has become more difficult. In order to meet the congressionally mandated deployment date of December 31, 1986, the Air Force will begin production of some major components before they are fully tested.

#### MAJOR RISKS TO ACHIEVING REQUIRED PERFORMANCE

Two areas of major risks to the Peacekeeper accomplishing its mission exist. The first of these is the extent the Air Force may have to accept reduced performance. In order to meet the deployment date set by the Congress, the Air Force (1) will start production of major components in 1984, before they are being fully tested and (2) will begin deployment before the fully developed system completes flight testing. The second major area of risk is changes in the threat.

#### Production will begin before major components are tested

To comply with congressional direction that the first 10 Peacekeeper missiles be deployed by December 31, 1986, the Air Force plans Peacekeeper production before (1) development is completed and (2) testing is accomplished to demonstrate that key missile components are producible and can meet operational requirements. The Air Force is confident that it can meet the deployment date with a missile that meets requirements. However, if unforeseen problems occur, time may not be available for corrective action before missile deployment.

Although the Air Force considers the first four test flights of the Peacekeeper successful, several subsystems are being changed. The Air Force has awarded or shortly will award contracts to produce the modified items. How well the modified items will perform will not be known for some time. These modified or changed items are discussed below.

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<sup>1</sup>Superhardened relates to increase in the resistance of the target to the effects of nuclear weapons beyond levels previously believed technically possible.

### MK 21 reentry system

The new MK 21 reentry vehicle is critical to Peacekeeper weapon system performance. The range of the Peacekeeper missile decreased when the MK 12A reentry vehicle was replaced with the heavier MK 21 reentry vehicle. This caused an increase in throwweight<sup>2</sup> which further reduced reentry vehicle range. Not all of the weight increase could be accommodated in the throwweight limits established by the unratified SALT II treaty. As a result, the amount of propellant had to be reduced to keep throwweight within limits, with a further decrease in range resulting.

According to the Air Force, the impact of range reduction has been mitigated by deploying the system near F. E. Warren Air Force Base in Wyoming and Nebraska rather than in the Great Basin of Nevada and Utah as proposed for multiple protective shelter basing. As a result of the more northern basing, the Air Force believes that the Peacekeeper with 10 reentry vehicles will continue to have the range to reach the most distant planned targets.

Program officials are confident that Peacekeeper's weight growth will not continue and that the missile, with 10 warheads, will continue to have the range to reach the most distant super-hardened targets. While testing of the booster stages supports the program officials' expectations, until a design of the MK 21 reentry vehicle has been proven and an operational reentry system fabricated, its final deployed weight will remain uncertain.

In addition, MK 21 performance is crucial in achieving the projected higher accuracy needed to offset Soviet silo hardness increases. Current Air Force accuracy projections are based on laboratory testing of engineering models and test flight of the missile using MK 12A reentry vehicles. The production contract for the MK 21 reentry vehicle will be awarded at about the same time as the first test flight of the MK 21 development model.

### Stage IV fuel tank

One of the remaining developmental tasks is designing and fabricating a liquid propellant fuel tank for stage IV of the missile's propulsion system. Initial efforts to develop a liquid propellant fuel tank were unsuccessful. In October 1982, the Ballistic Missile Office decided to terminate that effort and began development of a totally different concept. The concept selected is being used for the space shuttle and will be modified for the Peacekeeper missile. The first missile test flight using stage IV with the new concept is scheduled for the third quarter of

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<sup>2</sup>Throwweight is defined as the sum of the weight of the postboost vehicle, reentry vehicles, and any penetration aids. The Peacekeeper missile's maximum throwweight under terms of the unratified SALT II treaty is 7,937 pounds.

calendar year 1985, more than a year after the production contract was awarded.

#### Inertial measurement unit

Preeminent among guidance and control system concerns is the lack of capability to produce the inertial measurement units at a rate necessary to support deployment milestones.

To improve producibility, several changes to the inertial measurement unit were directed in April 1982 and are being incorporated into the production configuration. Evidence that the producibility problems will be corrected and the modified unit performs properly awaits fabrication and test of a model of the operational configuration. Fabrication of this model started in August 1983, and will not be completed until December 1984. However, to meet the deployment schedule, the Air Force will contract for production units in the spring of 1984. Consequently, the Air Force will start producing for deployment inertial measurement units before their performance adequacy has been demonstrated.

#### Other guidance and control components

The production contract for other guidance and control system components will be awarded before a number of modifications have been completed and proven through flight testing. Critical components of the guidance and control system are in various stages of redesign and testing. These include the missile electronics and computer assembly, which performs monitoring, control, and communication functions for the missile; the auxiliary processor module, which processes coded launch commands; and the unique signal device, which prevents unauthorized or unintentional firing.

In addition, the software for the guidance and control system must be changed. The basic flight program performed successfully, but ground program software must be changed to accommodate basing Peacekeeper in Minuteman silos. Also, software memory needs currently exceed computer memory capacity by 18 percent. The updated program will first be used for a missile test flight in the third quarter of 1986. The first test missile incorporating all the changes currently being made to the guidance and control system, including the operational configuration of the inertial measurement unit, is scheduled to be flown either the first or third quarter of calendar year 1986, depending on how soon all changes can be made. Results of this testing will be too late to permit changes in units being produced for deployment by December 31, 1986.

#### Deployment will begin before the final production configuration is validated

To comply with the congressionally mandated initial deployment date, the Air Force developed a tight, success-oriented

schedule. Testing is out of sequence. Three test flights scheduled to take place before initial deployment to verify performance of the final system configuration will now be conducted after deployment.

Threat assessment and  
operational performance  
evaluation not current

Changes in the threat a weapon system is expected to overcome can have a negative affect on the ability of the system to accomplish its mission. A change in Soviet target hardness did occur which had such an impact on Peacekeeper.

The Soviets, according to the Air Force, increased the hardness of a majority of their silos by a factor of three since the Peacekeeper weapon system began full-scale development. Target hardness is one of several factors used by the Air Force to calculate the Peacekeeper's damage capability. If the Air Force chooses to offset increased silo hardness, some improvement beyond the current requirement for accuracy or an increase in warhead yield, or both, may be necessary.

Peacekeeper's target damage capability can be substantially improved by better weapon system accuracy. Based on flight test data, Ballistic Missile Office officials believe accuracies better than required may be achieved.

The Peacekeeper missile's damage probability could also be raised by increasing warhead yield. The Air Force plans to deploy Peacekeeper with the current yield warhead, but retains the option to load the missiles with higher yield warheads if necessary. Increasing warhead yield would, however, negate savings in scarce nuclear materials, one of the principal reasons for substituting the MK 21 reentry vehicle for the MK 12A reentry vehicle.

Normally, the threat and system-threat interaction for major weapon systems are kept current by being periodically updated. However, the technical performance requirements for the Peacekeeper missile have not been updated since February 1979. Available information suggests that the Soviets have increased their silo hardness threefold which emphasizes the need for a formal reevaluation of the threat.

DOD instructions call for detailed analyses of the threat and projected weapon system effectiveness at the outset of major programs. Thereafter, the continuing effectiveness of the system in the intended threat environment is to be confirmed at major decision points, such as full-scale development and production approval. However, major Peacekeeper decisions and program approvals were made outside the normal process. Consequently, normal threat analysis update procedures were bypassed.

## CONCLUSIONS AND RECOMMENDATION

Peacekeeper program officials are confident that the missile will meet performance requirements. However, changes have occurred that affect Peacekeeper's projected capabilities. To date, mitigating factors, according to Ballistic Missile Office officials, appear to have offset reduced missile performance, enabling the Peacekeeper to stay within established acceptable performance parameters.

The ability of the Peacekeeper to accomplish its mission, however, may have been impaired because a major change has occurred in the threat it was initially designed to overcome. Formal reassessments of the ability of the Peacekeeper to meet the expected threat apparently have not been made. Risks exist that threat changes may require modifications to improve missile performance.

Until the Air Force has a final design for the Peacekeeper missile that has been fully tested, the potential for changes exists and the possibility of performance degradation is present. Changes have already occurred whose impact on system performance the Air Force can only estimate. Additionally, in order to meet the deployment deadline, the Air Force will begin production of a number of components whose performance in the Peacekeeper system will not have been verified through flight test.

We recommend that the Secretary of Defense update the Soviet threat assessment and evaluate Peacekeeper's technical performance relative to the revised threat.

## AGENCY COMMENTS

DOD officials agreed that the Peacekeeper's technical performance requirements should be updated. They stated that a new threat assessment will be published in September 1984, and it will be used to evaluate Peacekeeper.

DOD officials also agreed that production contracts will be awarded before all full-scale development testing is completed. They felt risks were mitigated by the extensive development and flight proof testing already completed. Further, they stated that in most cases manufacturing tooling and procedures used to fabricate development hardware are very similar to those used in the production program.

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